



# **Sustainable RAC&F-sector transformation: now and for all!**

## **Ozone2climate Industry Roundtable 2018**

Beijing HVAC Conference 10 April 2018

Ir. Igor C. Croiset  
GIZ – Senior Advisor



## Introduction

- Climate change conferences, Kigali amendment, EU F-gas are among other pushing to reduce emissions,
- Emissions translated into CO<sub>2</sub> eq. are being reduced in many sectors, Building and housing energy demand, efficiency HVAC, automotive, energy production etc.
- HVAC is a large contributor at overall country level emissions up to 30-40%, secondly low hanging fruit due to relative short life cycle and easy to do.



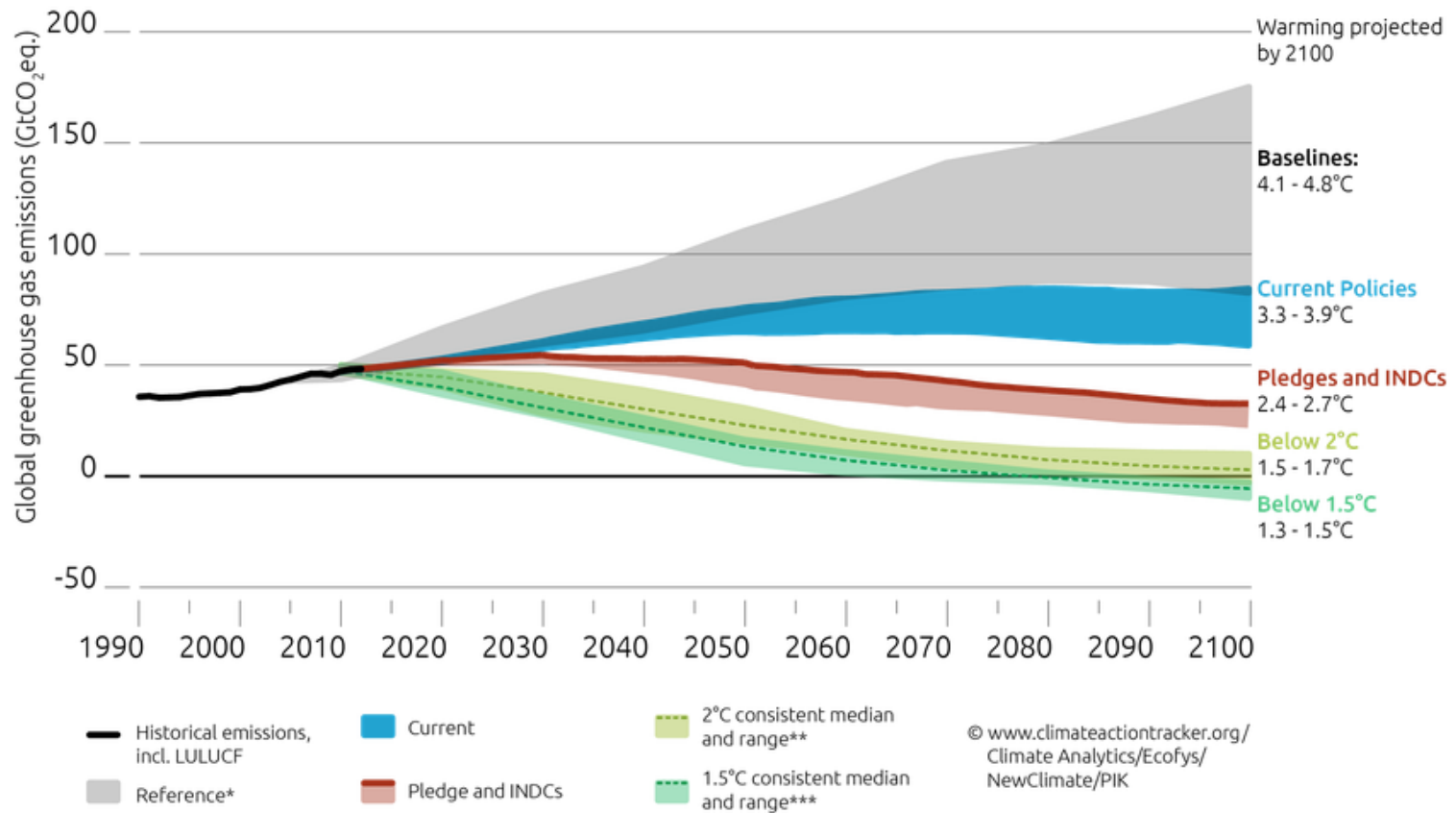
## Introduction

- A lot of information, technologies, political agendas are flooding the HVAC Industry.
- E.g. Holland decided that from now on all heating must move from gas to heat pumps! “Traditional heating company: what is a refrigerant?”
- These changes pushed by the absolute need to improve the environment are for most companies extremely disturbing.
- Understand what the drivers are and then the logic answer is:

*Now and for all natural !!*

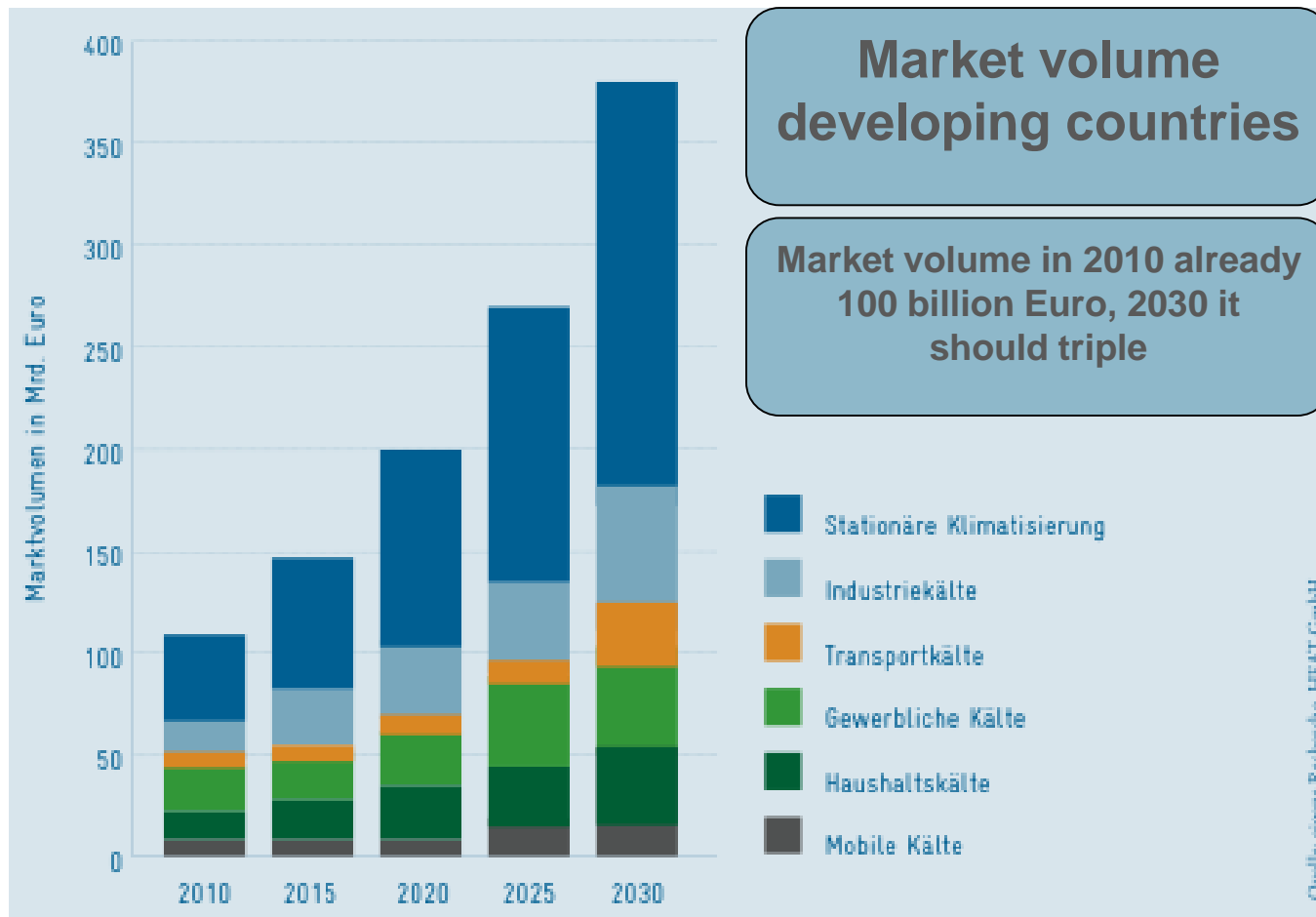


## Now and for all: background global GHG mitigation





## Market Volume



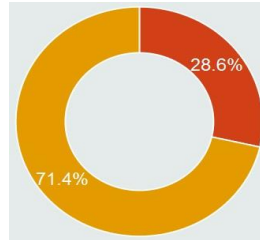


# Emissions from the refrigeration and AC sector

## Overall Emissions

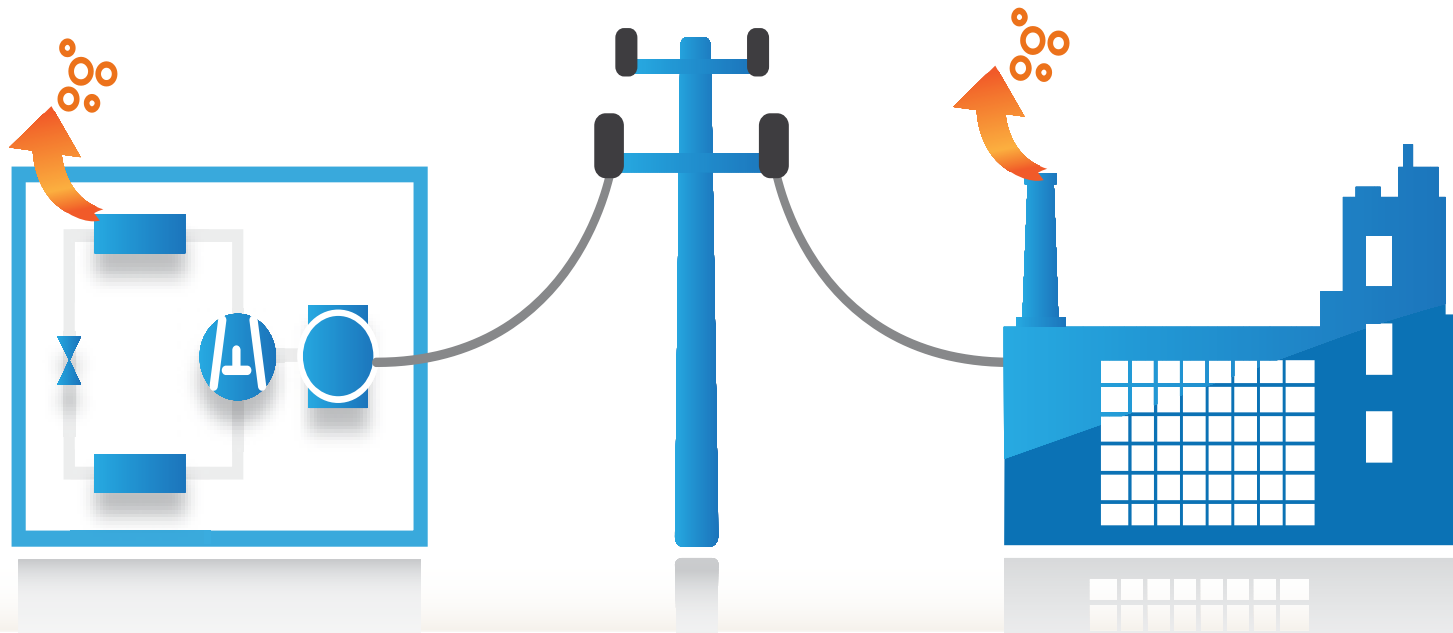
### Cooling

→ Direct Emissions  
refrigerants (e.g. HFC)



### Electricity Production

→ Indirect Emissions (CO<sub>2</sub>)





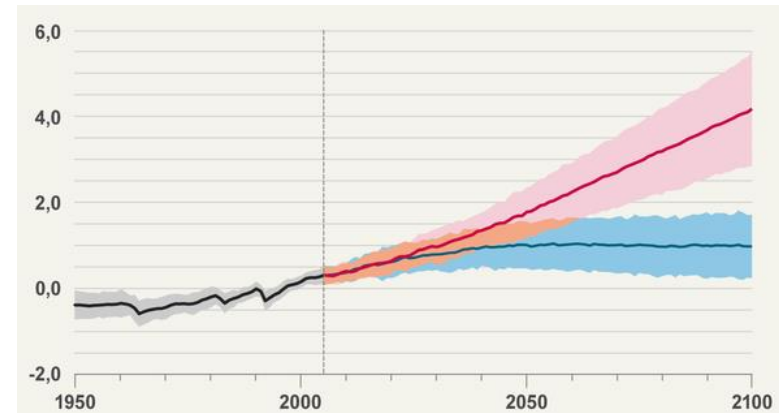
*handelszeitung.ch*

# Key drivers for increasing cooling needs

- Population increase and urbanisation
- Increasing wealth
- Climate change with increasing temperatures (positive feedback)



*commons.wikimedia.org*

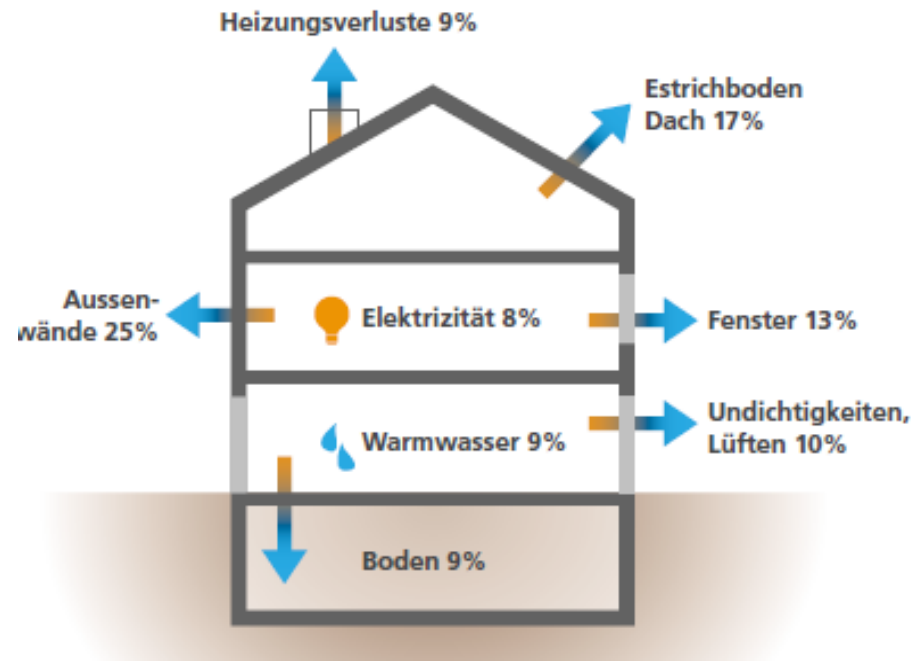


Marotzke et al. 2015: Climatic future



# Where do we loose and need energy for

- A typical home in Switzerland or EU
- Major losses are walls and roof
- 50% of energy used in households!
- Strong efforts in the EU to reduce energy demand i.e:
  - Energy needed for heating and cooling
  - Resulting in smaller more efficient systems with lower energy consumption

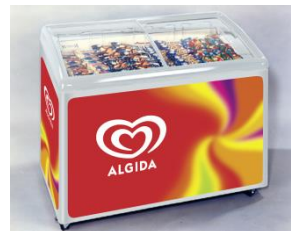
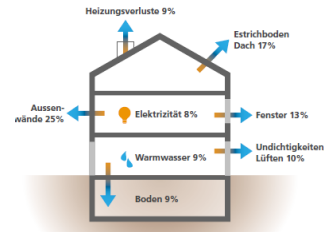


Energie Schweiz





# Focus on “Low Hanging Fruit”, found in RAC&F





# Refrigerant cost development due to F-gas

- EU refrigerant costs are pushed up by phase-down, natural increased market share and HFO introduction

## QUOTA SYSTEM

EU F-gas regulation considers the average consumption between 2009 and 2012 as a baseline to apply phase down steps expressed in MTCO<sub>2</sub><sub>equiv</sub>

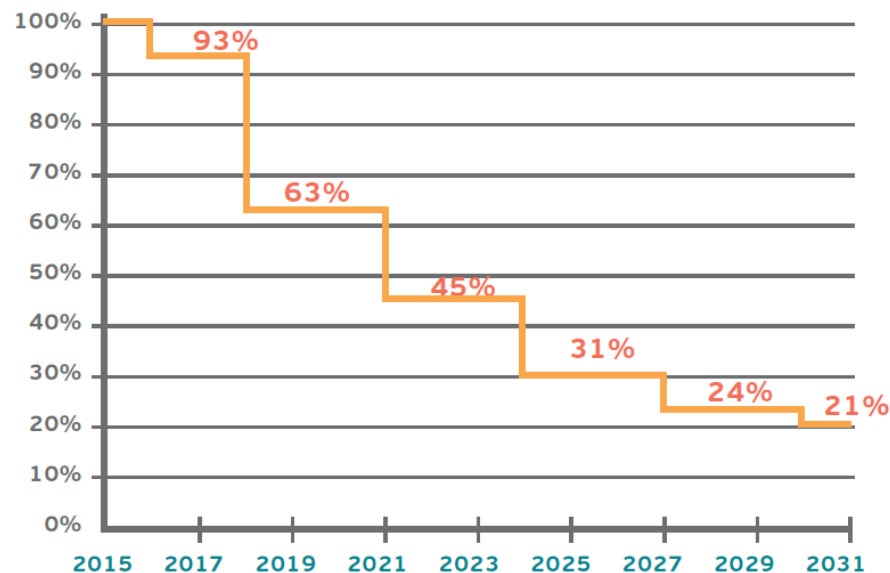


Fig.1 HFC Phase Down Schedule (EU regulation 517/2014)



# EU F-gas consumption is measured in CO<sub>2</sub>eq

Refrigerant	Composition	GWP	kg needed for 1 T CO <sub>2</sub> eq	kg needed for 5 T CO <sub>2</sub> eq
R134A		1430	0.7	3.50
R404A	R125/143a/134a	3920	0.26	1.28
R410A	R32/125/134a	2090	0.48	2.39
R448A	R-32 / R-125 / R-134a / R-1234ze / R-1234yf	1387	0.72	3.60
R407F	R32/125/134a	1820	0.55	2.75
R32		675	1.48	7.41
R161		12	83.33	416.67
R290		3	333.33	1666.67

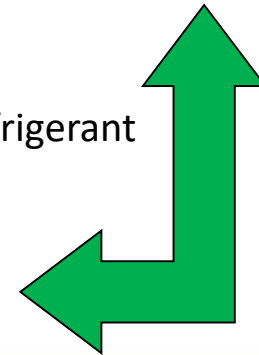
GWP



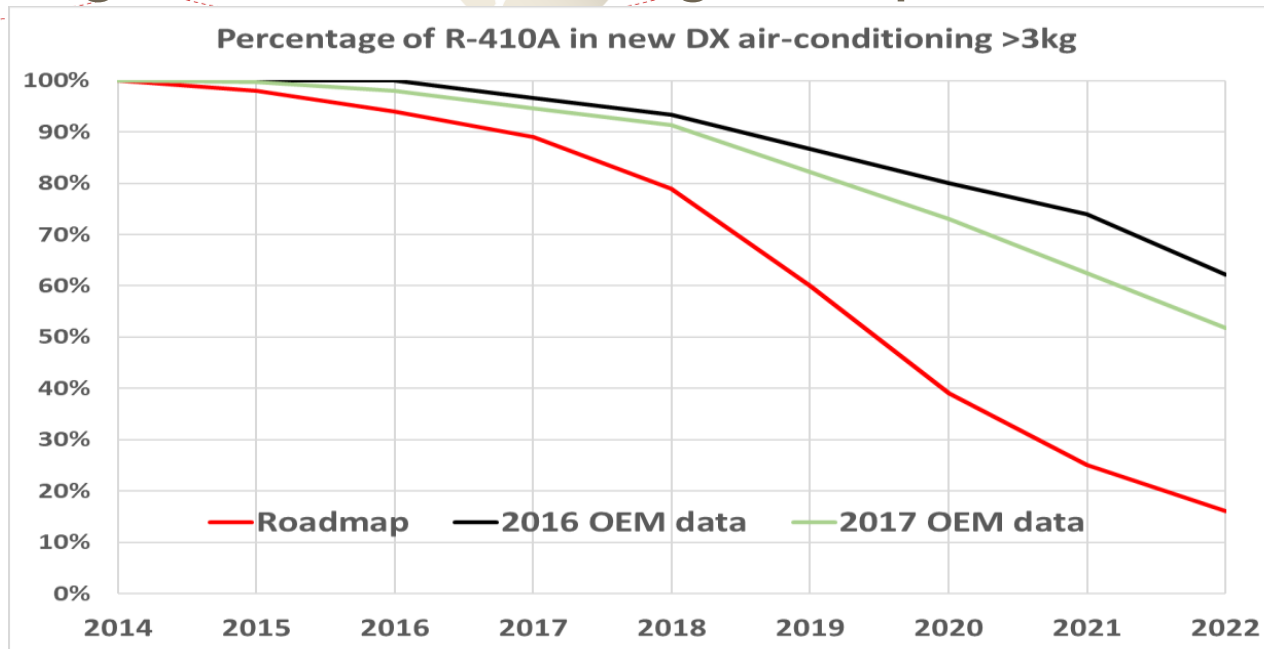
1 T CO<sub>2</sub>eq

404A(GWP 3920) →  $1000/3920 = 0.26$  kg 404A refrigerant

The higher GWP the less refrigerant can be bought inside the assigned quota!



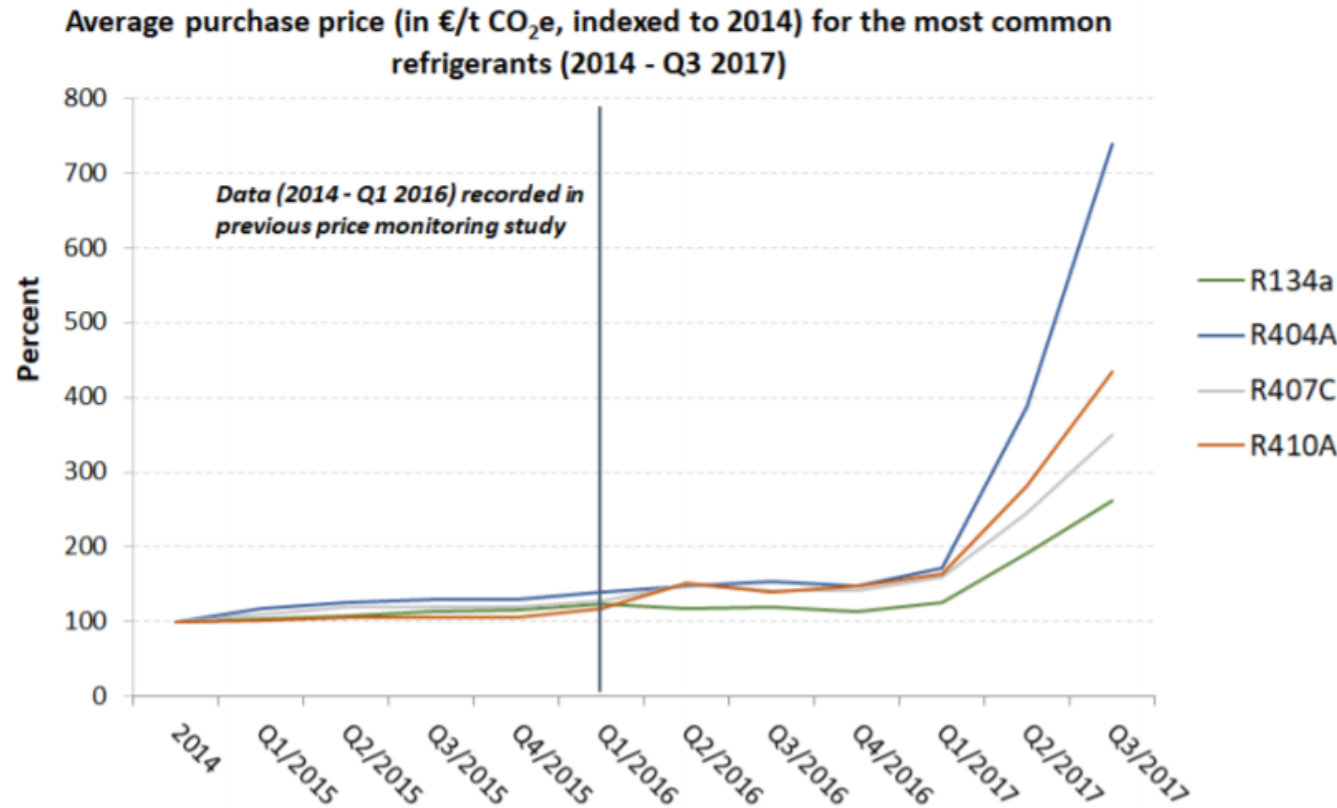
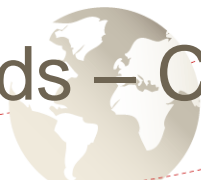
# Refrigerant trends – F-gas impact



## EPEE Brussel March 2018 – EU F-gas influence

- Decline of High GWP refrigerants, highest first 404A, 410A, 407F .....
- Best choice extreme low GWP options all other a headache the coming years

# Refrigerant trends – Costs refrigerants



Source Öko-Recherche 2018

- 404A practically not available, Very expensive (>100€/kg)
- 410A rising in price dramatically (>40€/kg)



## Example of partner country GIZ mitigation potential

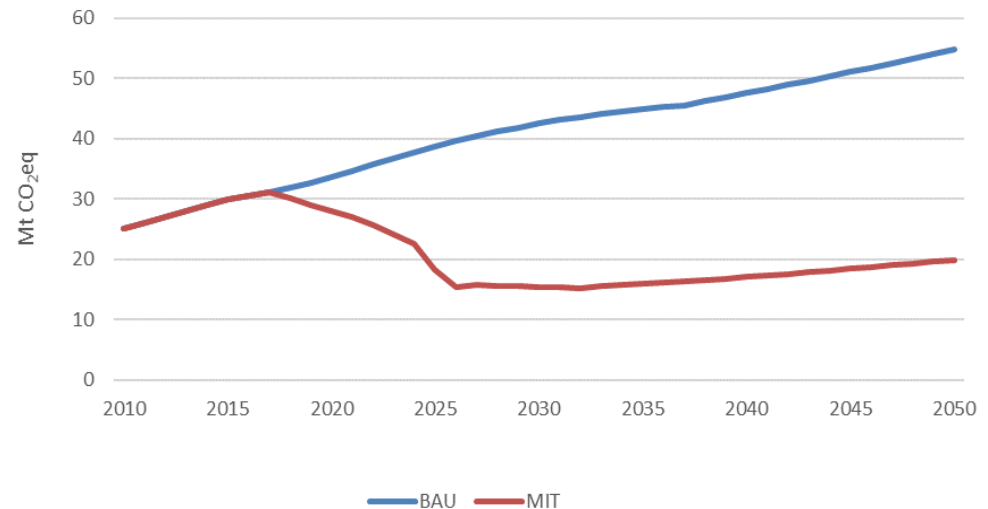
Reduction cooling  
demand

➡ Insulation

Direct transition to  
R290

➡ Reducing direct  
emissions

➡ Higher efficiency  
Split units





## Summary

- The global emission scenario leads inevitable to very low GWP refrigerants
- High energy efficiency is another driver considering growth of population
- All combined with a sound insulated buildings for reducing the energy demand for heating and cooling
- In addition to labelling of buildings opens the need of suppliers who certify the energy consumption

# Now and for all go Natural


[Blauer Engel](#)
[Produktwelt](#)
[Für Unternehmen](#)
[News & Infos](#)
[Aktionen](#)
[MERKEN \(0\)](#)
[DE](#) [EN](#)

[Produkte A-Z](#)

[Unternehmen A-Z](#)

[Vergabekriterien](#)


[Startseite](#) » [Produktwelt](#) » [Elektrogeräte](#) » [Klimageräte](#) » [Raumklimageräte](#)

» [Midea Split-type Room Air Conditioner All Easy Series MSAEBU-09HRFN7-QRD6GW, MSAEBU-12HRFN7-QRD6GW](#) Nennleistung 9000 BTU/h, 12000 BTU/h Kältemittel: R290

## Midea Split-type Room Air Conditioner All Easy Series MSAEBU-09HRFN7-QRD6GW, MSAEBU-12HRFN7-QRD6GW Nennleistung 9000 BTU/h, 12000 BTU/h Kältemittel: R290

[/ Produkt merken](#)
[Merken \(0\)](#)

*Momentan sind keine weiteren Produktinformationen vom Unternehmen hinterlegt.*

### Vorteile für Umwelt und Gesundheit

- ✓ Hohe Energieeffizienz
- ✓ Geringe Emissionen treibhauswirksamer Gase
- ✓ Geringe Geräuschemissionen
- ✓ Verringerung der Schadstoffgehalte

### Produktinformationen

[► Produkt Webseite](#)

### Kontakt

Midea Europe GmbH  
Eisenstraße 9c  
65428 Rüsselsheim  
Deutschland

# No way back





Proklima International



## PROKLIMA

### Guidelines for the safe use of hydrocarbon refrigerants

A handbook for engineers, technicians, trainers and  
policy-makers – For a climate-friendly cooling

**giz** Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH

On behalf of

**BMZ**



Federal Ministry  
for Economic Cooperation  
and Development



Proklima International



## PROKLIMA

### Guidelines for the safe use of flammable blowing agents in the production of extruded polystyrene boards (XPS)

A handbook for engineers, technicians, trainers and  
policy-makers – For a climate-friendly insulation

**giz** Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH



On behalf of



Federal Ministry for the  
Environment, Nature Conservation  
and Nuclear Safety

of the Federal Republic of Germany



## For further information contact

Ir. Igor C. Croiset

GIZ – Senior advisor

Email: [Igor.Croiset@yahoo.com](mailto:Igor.Croiset@yahoo.com)  
[igor.Croiset@proklima.net](mailto:igor.Croiset@proklima.net)

Skype: igor.croiset

Bernhard Siegele

GIZ

Program manager

[Bernhard.siegele@giz.de](mailto:Bernhard.siegele@giz.de)

# *Thank you for the attention*

*Good Training, design  
an absolute must and  
fun to do*

